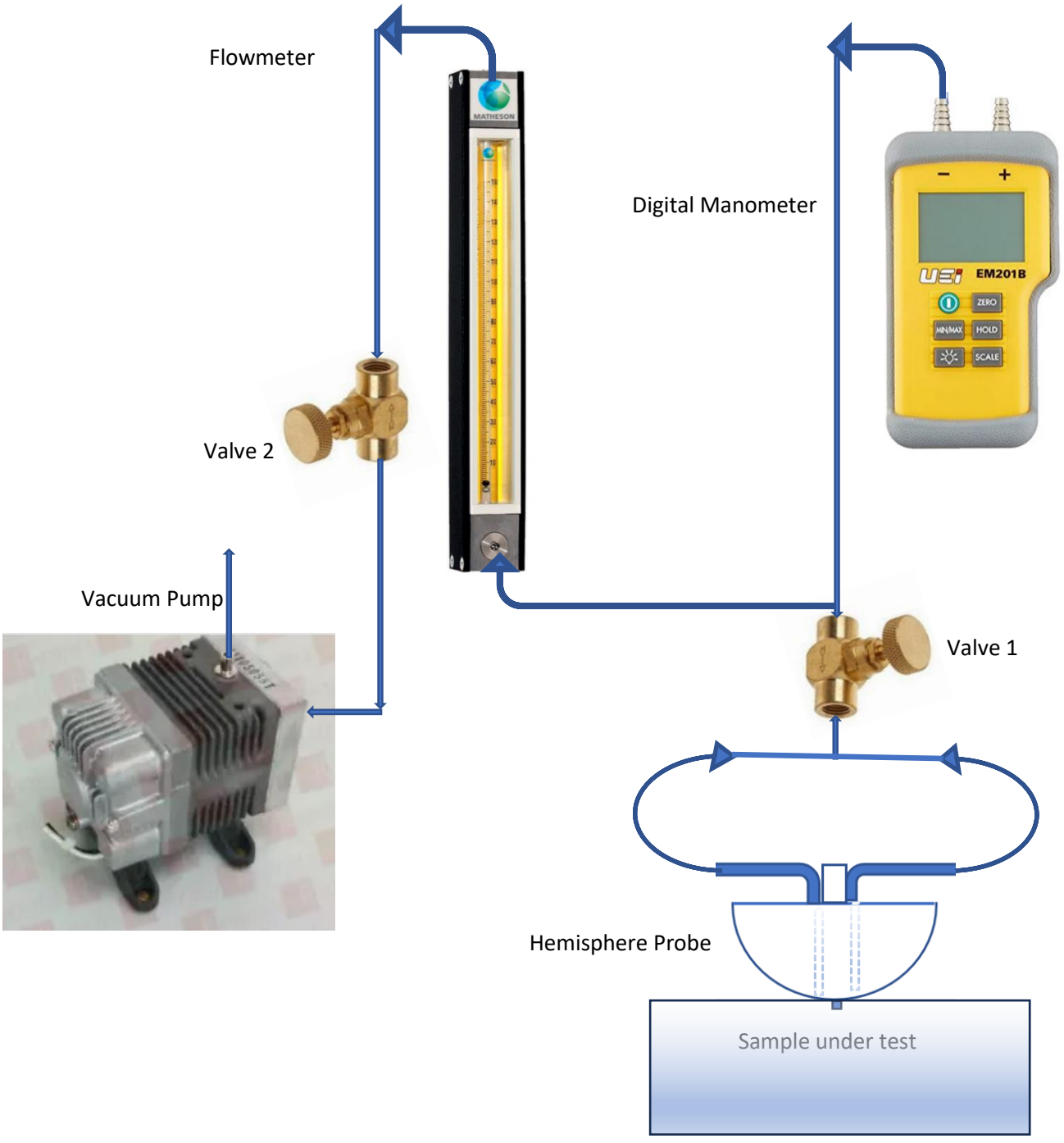
Airflow Resistance Test Equipment

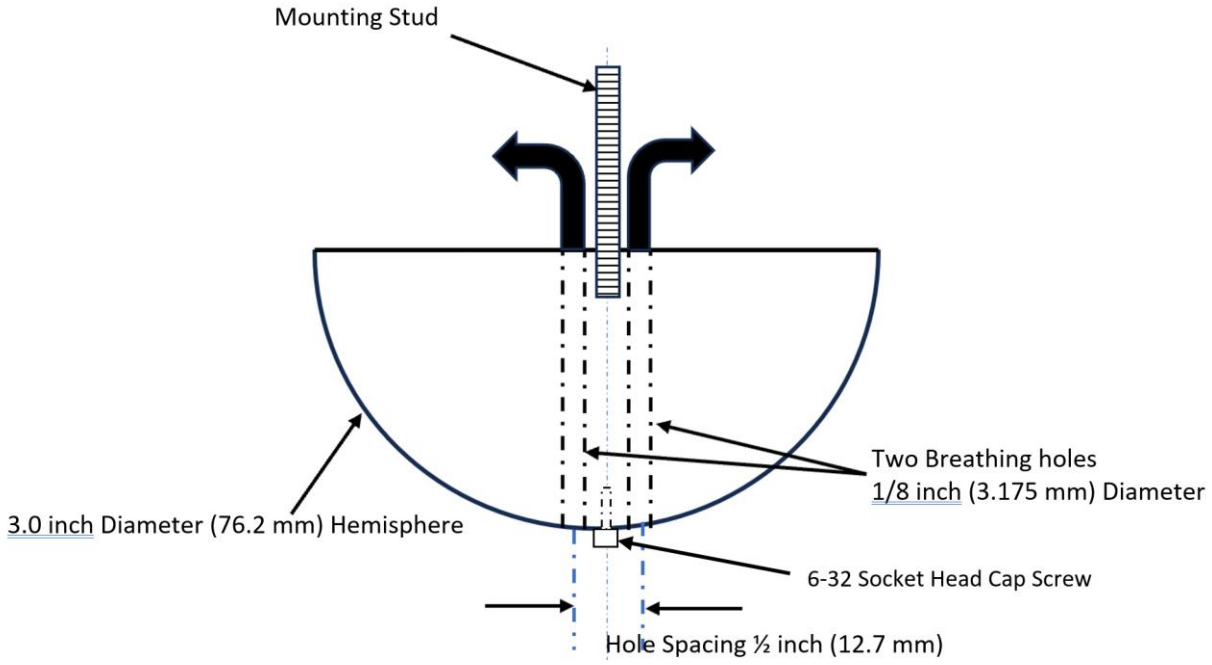


Vacuum Pump	Amazon - Lab Diaphragm Vacuum Pump VP-10L
Flowmeter	Dwyer – VFB-68 (0 – 4 LPM)
Manometer	Amazon - UEi Test Instruments EM152 Dual Differential Digital Manometer
Needle Valves	Amazon - Needle Valve 1/8" Female NPT
Probe	Custom – 3 inch hemisphere with 2 breathing holes

Vacuum Pump

Needle Valve

A fixed gravity load of 10 Newtons is applied to the probe



Airflow Test Protocol

1. Equipment list attached. Examples of component sources are provided – similar components are acceptable.

2. Connect components as shown in the attached graphic schematic

3. Zero the manometer

4. Adjust needle valve 1 to set 2.0 LPM on the flowmeter.

5. With probe face open to the atmosphere, adjust needle valve 2 to achieve 1.0 inches of water on the manometer, (+/- 0.2 in. water).

6. Zero the manometer. (subtracting the equipment Pressure Drop from the measurement)

7. Lower the probe onto the test specimen until the force = 10 Newtons

8. Do not re-adjust valve 1.

9. Record the vacuum displayed on the manometer

Potential error analysis

It is important to use a flowmeter without any valve at the bottom or top. (Even fully open, needle valves are usually too restrictive.) Use valves 1 and 2 with large openings. All tubing and fittings should minimize restrictions to the extent possible. With valve 2 open, the manometer will display the equipment pressure drop, which should be below 1 inch H_2O. With the probe breathing freely, closing valve 1 will adjust the equipment PD up to one inch H_2O for testing. The manometer is then set to zero to automatically subtract the equipment PD and displaying the sample material PD.